Message

From: Hays, David C Jr CIV USARMY CENWK (USA) [David.C.Hays@usace.army.mil]
Sent: 2/17/2021 10:39:34 PM
To: Praskins, Wayne [Praskins.Wayne@epa.gov]
CC: Kappelman, David [Kappelman.David@epa.gov]
Subject: RE: HPNS RGs and MDCs
Attachments: Pages from epa-600-r-14-107_-_gross_alpha_-_gross_beta_508_km_08-08-2014.pdf

Wayne, Answers to your follow up questions are below:

1. We do this at most sites where gross alpha counting is used to release equipment or material to an isotopic specific limit. Alternatively (like the Navy) for ease of calculations some projects just assume all emissions are from the isotope with the lowest limit. With decay chains this can be overly conservative (a factor or 3 to 11 conservative). This conservatism is ok when limit is high enough that it does not matter. When the limit is low, daughter emissions should be considered for gross measurement techniques. I know we have accounted for emissions at Welsbach and Maywood NPL sites. Would have to look for more info but note at these sites we did not use generic BPRGs. We used site specific calculations or had a ROD specified limit. Primary contamination is from the Th decay chain on both sites. We take the Th-232 specific limit and adjust for alpha and beta emissions to determine a gross alpha and beta DCGL. We do not account for emissions that are not measurable (0% eff) by a specific instrument or measurement technique (like Ra-228 beta) or when daughter decay fraction is very low.

   FYI: The derivation of a DCGL is outside the scope of MARSSIM but section A.3.4 provides an example of converting an isotopic DCGL to a gross DCGL using instrument factors, albeit from 1 contaminant without radioactive daughters. This example demonstrates that other things can be considered into DCGL. FYI2: We have discussed the issue of radon and assumptions of equilibrium in a sample. I was reviewing EPA guidance on water sampling for Ra-226 and see discussions of an increase of a factor of 4 in gross alpha counts due to daughter ingrowth. Given that is from separated Ra-226 I now would say no need to assume loss of Radon. Thus a gross alpha result of 4 dpm = 1 dpm of Ra-226. See attached excerpt.

2. Using a critical level to decide what wipes to analyze is one piece of overall approach. We would choose a short count time (typically 1 min) based on time and resources only, then calculate the Lc for that. We would rely on the longer count or lab results and compare that MDC and result to the assumption of release fraction or BPRG. The actual Lc and MDC of the short count is not used to compare to any limit so basically irrelevant for compliance. Idea being that most samples/wipes are not contaminated, so to not waste time counting samples/wipes with background levels we screen/focus longer counts/lab analysis on wipes that have higher than screening background counts (actually are contaminated). If all screening counts are not elevated then a random number are counted longer or sent to lab. I use this approach typically with air sampling filters but see no reason why approach should be different for wipes.

Hope this helps.
Dave

From: Praskins, Wayne <Praskins.Wayne@epa.gov>
Sent: Tuesday, February 16, 2021 12:42 PM
To: Hays, David C Jr CIV USARMY CENWK (USA) <David.C.Hays@usace.army.mil>
Cc: Kappelman, David <Kappelman.David@epa.gov>
Subject: [Non-DoD Source] RE: HPNS RGs and MDCs

Dave –

Thanks! Two follow ups:

1. You mention (and we have discussed) setting a gross alpha limit based on contaminants, isotopic ratios, and equilibrium assumptions. Do you know of any examples where that's been done?
2. You mention that you have used a counting instrument's critical level to decide which wipes to send to a lab or count longer. If you do that, how would you pick the targeted critical level? Would you set it at your BPRG/release limit (accepting a MDA above the BPRG/release limit for some or most samples)?

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From: Hays, David C Jr CIV USARMY CENWK (USA) <David.C.Hays@usace.army.mil>
Sent: Friday, February 12, 2021 5:33 AM
To: Praskins, Wayne <Praskins.Wayne@epa.gov>; Kappelman, David <Kappelman.David@epa.gov>
Subject: RE: HPNS RGs and MDCs

Wayne, Good morning. The counting statistics they are referencing are correct. What they are presenting is somewhat simplistic by keeping sample and background count times the same which CDPH did not. As such they did not provide a direct apples to apples comparison to CDPH approach. The cited reference document has equations for differing background and sample count times as well. With that said, I agree a 1.2 dpm/100 cm2 limit is very difficult and would require longer count times at best. Where I see flaws in their logic is that the 1.2 BPRG is specific to Ra-226 and not a gross alpha limit. A gross alpha limit based on contaminants, isotopic ratios, and equilibrium assumptions would be higher given the site specifics. It may still require longer than 1 min count times typically used in the field.

They also should consider changing their approach to counting and to the number of wipe samples required. Other instruments could be used for gross alpha counting (reducing count times) as well as sending them to a lab. I recommend reducing the total number of wipe samples required to account for any increased count times. This can be done given consideration of the purpose of wipe sampling. As an example: we typically will just use wipe samples to verify assumptions in our risk models are appropriate. We rely on our fixed instrument readings to identify contamination and then only wipe sample the areas of known contamination. This greatly reduces the total number of wipes to count. As a conservative measure we wipe sample 10% of fixed reading locations regardless of instrument readings. Additionally, use of the fixed instrument critical level can be used as an investigation level requiring a wipe sample. The results of these wipe samples are used to confirm if the risk model assumptions for removable fraction are correct or conservative. If not, release limits may be incorrect and should be evaluated accordingly.

One consideration we also have done is use the counting instruments critical level to decide on wipes to send to a lab or to count longer. Another total count time reduction approach. Every sample is counted but only samples with counts distinguishable from background are counted longer (to meet MDC DQO).

Finally, a MARSSIM scenario B approach could be considered. Given some background levels of NORM isotopes may be present in dusts. This would be more involved.

Hope this helps:
Dave Hays

PS: With all of this said, the BPRG is very low as a result of the conservatism in the generic BPRG model used. As we have discussed, even a small change to site specific assumptions and source removal rate would increase the BPRG. The Navy seems to still be stuck on just saying the number is too low rather than trying to solve the issue.

From: Praskins, Wayne <Praskins.Wayne@epa.gov>
Sent: Thursday, February 11, 2021 7:47 PM
To: Hays, David C Jr CIV USARMY CENWK (USA) <David.C.Hays@usace.army.mil>; Kappelman, David <Kappelman.David@epa.gov>
Subject: [Non-DoD Source] HPNS RGs and MDCs

Dave and Dave –

We continue our discussion with the Navy about remediation goals for the removable fraction of any remaining radiological contamination at HPNS buildings. This afternoon we received responses to two questions about MDCs, with the Navy continuing to argue that it's impractical to measure the 1.2 dpm/100cm2 Ra-226 BPRG. I'd be interested in hearing your take on the accuracy and reasonableness of their responses. Thanks.

QUESTION #1. What are the detection limits of swipe analyzing instruments?

NAVY RESPONSE: The Parcel G Retesting Work Plan uses the Ludlum Model 3030 as a swipe counter, the same instrument that was used by CDPH at Parcel A. Count times required for various alpha MDCs using the Ludlum Model 3030P are as follows:

An MDC of 17.3 DPM/100 cm^2 requires a 1 min sample and background count time
An MDC of 3.5 DPM/100 cm^2 requires a 10 min sample and background count time
An MDC of 1.2 DPM/100 cm^2 requires a 60 min sample and background count time

Assumptions made are from the Ludlum specifications[1] as follows: background count rate of 0.3 CPM and instrument efficiency of 32% (Ra-226)

The required sample and background count times exponentially increase the lower the required MDC.

There are an estimated total of 5,500 swipes required for the Parcel G buildings, and an estimated total of 23,000 swipes required for all of the buildings at Hunters Point. Assuming a 40 hour work week for swipe processing, factoring in collection of 1 background sample for every 24 hours, would **require nearly 13 years to complete** at the 60 minute count time.

This is technically impractical, purely from the equipment detection limitations.

When measuring levels so close to zero, there will inherently be false positives caused by factors not attributable to Ra-226 contamination including: NORM in dust, instrument background fluctuations, low counting statistics, and/or equipment uncertainties. Demonstrating compliance with the proposed Ra-226 removable contamination limit of 1.2 DPM/100 cm^2 would result in an unacceptably high percentage of false positives. Statistically our goal is to achieve a 95% confidence level, which from a data standpoint, means we have confidence that the same sample would be replicated plus or minus 2 sigma from the measurement point. Contractor data from other projects at Hunters Point supports this position.
Additional MDC information may be found on *NUREG-1507 Minimum Detectable Concentrations with Typical Radiation Survey for Instruments for Various Contaminants and Field Conditions*[2]

QUESTION #2. CDPH used a 10-minute count time in their 2019 Parcel A dust sampling and achieved an MDA of 1.6 to 2.3 dpm/100cm2 with the following inputs/assumptions:

-Background Count of 30 minutes
-Background count rate of 0.26 CPM

-Sample Count Time of 10 minutes
-Instrument efficiency of 39%

NAVY RESPONSE. Using CDPH's assumptions, an MDC of 1.2 DPM/100cm^2 would be obtained using 35 minute sample and background count times. Even with an assumed increased instrument efficiency as high as CDPH's, the EPA proposed alpha removable fraction release criteria is still technically impracticable.

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